## What is claimed is:

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- An implantable medical device, comprising:
  a housing for containing electronic circuitry;
  an antenna embedded in a dielectric compartment; and
- circuitry within the housing connected to the antenna for transmitting and receiving a modulated radio-frequency carrier at a specified carrier frequency.
- 2. The device of claim 1 wherein the dielectric compartment is within a header for the device having feedthroughs therein for routing connections between internal circuitry and external leads.
  - 3. The device of claim 1 wherein the dielectric compartment is a dielectric pocket adjacent a surface of the device housing.
  - 4. The device of claim 1 wherein the dimensions of the antenna are such that a significant portion of radio-frequency energy delivered to the antenna at the specified carrier frequency is emitted as far-field radiation.
- 20 5. The device of claim 1 wherein the antenna is a helically coiled antenna.
  - 6. The device of claim 5 wherein the helically coiled antenna is oriented roughly parallel to a surface of the device housing and further wherein the electrical length of the antenna is approximately one-half wavelength of the specified radio-frequency carrier.
  - 7. The device of claim 5 wherein the helically coiled antenna is oriented roughly perpendicular to a surface of the device housing and further wherein the electrical length of the antenna is approximately one-quarter wavelength of the specified radio-frequency

carrier so as to act as a monopole antenna with the device housing serving as a ground plane.

- 8. The device of claim 5 further comprising an antenna tuning circuit for matching the impedance of the antenna to the transmitting/receiving circuitry at a specified carrier frequency by loading the antenna with inductance or capacitance.
  - 9. The device of claim 8 wherein the tuning circuit comprises a variable tuning capacitor for adjusting the resonant frequency of the antenna.

10. The device of claim 9 wherein the tuning circuit further comprises a balun transformer for converting between a single-ended signal generated or received by the transmitter/receiver circuitry and a differential signal generated or received by the antenna.

11. The device of claim 10 wherein a winding of the balun transformer is formed by the helical antenna.

- 12. The device of claim 1 wherein the device is a cardiac rhythm management device having rhythm control circuitry electrically connected to one or more electrodes adapted for disposition within or near the heart by one or more therapy leads.
  - 13. The device of claim 12 wherein the helical antenna is embedded within a header of the device coiled around a bore into which an end of a therapy lead is inserted.
  - 14. A method for transmitting and receiving radio-frequency signals in an implantable medical device, comprising:

transmitting or receiving a modulated radio-frequency carrier at a specified carrier frequency to or from an antenna embedded within a dielectric compartment of the device; and,

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matching the impedance of the antenna to the transmitting/receiving circuitry at a specified carrier frequency by loading the antenna with inductance or capacitance using an antenna tuning circuit, wherein a significant portion of radio-frequency energy delivered to the antenna at the specified frequency as far-field radiation.

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15. The method of claim 14 further comprising converting between a single-ended signal generated or received by the transmitter/receiver circuitry and a differential signal generated or received by the antenna with a balun transformer.

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16. The method of claim 15 further comprising adjusting the resonant frequency of the antenna to a specified carrier frequency with a variable capacitor.

17. The method of claim 14 wherein the antenna is a helically coiled antenna.

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18. The method of claim 17 wherein the helically coiled antenna is oriented roughly parallel to a surface of the device housing and further comprising transmitting at a carrier frequency with a wavelength approximately twice the electrical length of the

antenna.

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19. The method of claim 17 wherein the helically coiled antenna is oriented roughly perpendicular to a surface of the device housing and further comprising transmitting at a carrier frequency with a wavelength approximately four times the electrical length of the antenna such that the antenna acts as a monopole antenna with the device housing serving as a ground plane.

20. The method of claim 17 further comprising converting between a single-ended signal generated or received by the transmitter/receiver circuitry and a differential signal generated or received by the antenna with a balun transformer and wherein one winding of the transformer is formed by the helical antenna.

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